



Integrated Planning and Advising for Student Success (iPASS): State of the Literature

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Abstract

This paper examines the current state of the literature on Integrated Planning and Advising for Student Success (iPASS), an increasingly popular approach to technology-mediated advising reform. We limit our analysis to sixty relevant documents that have been released since 2010. We categorize these items into four different groups based on their aim and rigor: (1) *descriptive documents* (39 items) that describe processes and challenges of iPASS implementation, (2) *output reports* (12 items) that examine usage data to better understand iPASS implementation, (3) *correlational studies* (5 items) that examine non-causal associations between different functionalities of iPASS tools and student outcomes, and (4) *rigorous outcomes studies* (4 items) that employ experimental or quasi-experimental methods to provide causal or near-causal estimations of iPASS-oriented interventions. iPASS is a relatively recent reform approach, and while few studies are available that rigorously evaluate its effects, early findings suggest that individual components of iPASS interventions may have a positive impact on student outcomes, including persistence and credit accrual. This paper also offers suggestions on how colleges can use non-causal research to support and improve iPASS.

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1. Introduction

Colleges and universities are increasingly turning to technology to help provide more holistic support to students and to keep them on track to graduation. Over the past several years, an approach to technology-mediated student advising called Integrated Planning and Advising for Student Success (iPASS) has taken root. iPASS makes use of technology to promote, support, and sustain long-term, intrusive advising relationships. iPASS enables college personnel to engage in advising and student support relationships¹ that (1) approach student support as a teaching function, (2) touch students on a regular basis, and (3) connect students to the information and services they need when they need them in order to keep students on track to program completion (Karp, Kalamkarian, Klempin, & Fletcher, 2016).

Since 2012, the Bill & Melinda Gates Foundation has funded 42 colleges to implement the approach, and at least two state systems (Tennessee and North Carolina) have launched iPASS technologies at scale. iPASS is also an integral part of broader institutional redesign and reform efforts, including the American Association of Community Colleges (AACC) Pathways Project and the University Innovation Alliance. Additionally, more than 120 companies have launched iPASS-related products (Tyton Partners, 2014). As iPASS spreads and investment in advising technologies and student supports grow, it is important to assess the impact of this approach on student outcomes. To what extent does iPASS improve persistence and completion rates? Is iPASS an effective strategy to increase the numbers of students obtaining postsecondary credentials?

One challenge in assessing the impact of iPASS is identifying or defining what constitutes iPASS. iPASS may look different at different institutions based on the college's technology tools, their vision for student support, and the specific needs of their student population. Since colleges have different goals for iPASS, they might utilize iPASS tools differently. iPASS technology tools are most commonly used for three functions: (1) course or degree planning, to help students make suitable and accurate

¹ The notion of advising and student support that is intended here goes beyond academic advising and career planning and includes access to academic assistance services such as tutoring and math and writing centers as well as to personal/social development supports such as counseling and mental health services.

course selection decisions; (2) coaching and career advising, to better connect students to services and support; and (3) early alerts and predictive analytics, which provide timely information to advisors, students, and others when students are at risk of falling off track to graduation. Using iPASS tools to perform more than one of these functions concurrently better enables colleges *to provide sustained, strategic, intrusive and integrated, and personalized* (SSIP)² student support. What is more, we posit that when multiple functions are integrated through iPASS, they have a greater impact than when iPASS tools operate in silos. An integrated approach allows college personnel to better collaborate and support students with a more comprehensive understanding of a student's circumstances and performance, both in and outside the classroom.

We emphasize that the use of technology tools alone does not constitute an iPASS intervention. Rather, it is crucial that colleges leverage technology tools to provide improved personalized student support. Using an early alert system to email a student who did not set up an individualized program plan is not an example of iPASS. But using the same early alert system to connect a student with an advisor who then works with the student to create an individualized program plan based on the student's interest is an example of iPASS. In this second scenario, not only is an iPASS tool used to identify a student at risk, but additional personalized support is provided to the student.

This paper examines the current state of the literature on iPASS. In particular it calls attention to the few studies that inform the field about the potential effectiveness of iPASS. The paper is based on an assessment of 60 papers and reports that describe or document recent iPASS-oriented reform efforts or that report on research conducted to better understand the effects of these efforts on student outcomes. It is important to note that these papers and reports generally report on technology-mediated interventions that perform a single function. In large measure, that is because the iPASS approach is still

² Stacey and Karp (2013) elaborated the notion of pervasive supports through the SSIP approach, which is rooted both in (1) research showing that challenges to college completion may crop up throughout students' college careers and in non-academic as well as academic domains (Chaplot, Cooper, Johnstone, & Karandjeff, 2015) and (2) in research demonstrating that students are often unaware that they need help, unwilling to seek it out, or unable to find sources of support (Cox, 2009; Karp, O'Gara, & Hughes, 2008). Thus, interventions need to be sustained, to catch students when they need help, and strategic, to connect students with the type of support they need when they need it. They also need to be multi-faceted and intrusive to be certain that students encounter them. Making non-academic support an integral part of every student's experience means that all students will receive help, even if they think they do not need it.

relatively new. Thus many of the interventions discussed in the documents do not involve holistic SSIP support that we consider a hallmark of iPASS.

Still, existing literature on non-integrated or non-holistic technology-mediated advising can provide critical insight into the potential impact of the broader approach that is iPASS. Therefore, in this paper we include documents that examine iPASS tools that support at least one of the aforementioned functions; we also include documents that discuss broad iPASS reform efforts more generally. Using this method, we describe what kinds of papers and reports have been released about iPASS and closely related interventions over the past seven years. We appraise what is known about the potential efficacy of iPASS on student outcomes based on the subset of the literature with strong research evidence.

The paper proceeds as follows. We first describe the methods we used to search the literature and determine which items are relevant. Next, we provide a general overview of the literature available on iPASS, organized by the scope and rigor of the studies and other documents examined. Then we review the more rigorous studies as determined by criteria rooted in CCRC's Assessment of Evidence Series (Bailey, Jaggars, & Jenkins, 2011) to draw conclusions about iPASS' potential effect on student outcomes. We conclude with suggestions for next steps for assessing the impact of iPASS and conducting future research.

2. Methods

Our CCRC team looked for relevant iPASS literature in four online academic and research-based literature databases: CLIO (online library catalog of Columbia University), EBSCO, Google Scholar, and JSTOR. We also searched both institutional research websites of early adopter iPASS colleges and vendor websites (see Appendix Figures A.1 and A.2 for a list of college and vendor websites). We solicited additional potential materials through an iPASS grantee listserv. Finally, we asked individual vendors for potential items. We limited our literature search to documents published since 2010 because iPASS technology and iPASS as a reform has grown and evolved exponentially in more recent years.

Within the databases, we used search terms (see Appendix Figure A.3) that name or characterize iPASS reforms generally (such as “Integrated Planning and Advising Services (IPAS),” “Integrated Planning and Advising for Student Success (iPASS),” “advising reform + technology”) or that are associated with common elements of iPASS (such as “e-advising” and “early alerts”). We also searched these terms in combination with terms such as “student outcomes” (e.g., “early alerts + student outcomes,” “iPASS + students outcomes”) as we were most interested in understanding the impact of iPASS on student outcomes.

The items that we found in our initial search efforts included journal articles, reports, policy briefs, internal documents (accessible on institutional research websites), and industry-produced reports. We collected and reviewed roughly 110 items that appeared by their titles and short descriptions to examine iPASS-oriented reforms. After collecting and reviewing all the documents, we created a spreadsheet with individual rows for each document and indicated whether or not each document discussed one or more iPASS functionalities by labeling items with a “0” or “1” and also indicated whether or not they fell into our established timeframe (2010–present). Items that did not meet both criteria, such a news article or blog post, were excluded from further review. At least two members of our research team then reviewed each of the remaining 60 documents that matched our criteria, recording notes in the spreadsheet when applicable on what intervention was examined, the research questions posed, methods, samples, key findings, and strengths and limitations of the research. In addition, using the same criteria found in the CCRC Assessment of Evidence Series (Bailey, Jaggars, & Jenkins, 2011), we then scored each study that examined student outcomes on a three-point scale assessing the rigor of the research method used (See Appendix Figure A.4).

In the end, we categorized the 60 documents into four different groups based on their purpose and rigor: (1) *descriptive documents* (39 of the 60 items) that describe processes and challenges of iPASS implementation, (2) *output reports* (12 of the 60 items) that examine usage data to better understand iPASS implementation, (3) *correlational studies* (5 of the 60 items) that examine non-causal associations between the different functionalities of the iPASS tools and student outcomes, and (4) *rigorous outcomes studies* (4 of the 60 items) that employ experimental or quasi-experimental

methods in a rigorous way to provide causal or near-causal estimations of iPASS-oriented interventions.

3. Overview of iPASS Literature

Most of the documents we examined described the ways in which institutions implement iPASS technologies and interventions. Very few studies we encountered rigorously evaluated differences in student outcomes as a result of an iPASS intervention. This likely reflects the newness of iPASS. The literature indicates that most iPASS reform efforts are nascent, and institutions have not yet had the opportunity to implement comprehensive iPASS interventions, track student-level data from enrollment through completion, or assess impact. We would expect to see a growth in outcomes-focused studies in the next few years as the field matures and institutions begin to implement and evaluate iPASS more systematically.

Although only studies that focus on outcomes enable one to assess the potential impact of iPASS, other types of accounts and studies are still important because they describe the context for iPASS reform efforts and help answer questions about the specifics of implementing an iPASS intervention. Thus, items in the literature that focus on implementation issues may be helpful for understanding the processes involved in iPASS technology implementation, such as how technology adoption affects the experiences of end users. These accounts often highlight the complexity of implementing iPASS technologies in ways that have the potential to affect student outcomes.

3.1 Descriptive reports

By and large, the descriptive reports we examined described processes for implementing iPASS technologies as well as challenges and potential benefits to end users of particular iPASS products. These reports typically included discussions about how iPASS technologies were selected and vetted by stakeholders, and they often provided insights into how the implementation process could have been improved. Many of the descriptive reports described the experiences and lessons learned by the institutions in implementing iPASS technologies.

The 39 descriptive reports varied in their quality, length, and focus. Several of the reports were brief 1–2 page summary descriptions of the institutional process for adopting iPASS technologies, sometimes including suggestions for future research projects or next steps for the institution. Other descriptive reports provided more in-depth discussion about institutional processes and presented findings from end-user and student surveys. For example, one report described the perceptions of six administrators at Purdue University regarding the implementation of Signals, an early alert technology, and the potential benefits that implementing an iPASS intervention could have on student success (Arnold, Tanes, & Selzer King, 2010). Similarly, a report from the Virginia Community College system described how results from a survey of interviews, coupled with some follow-up interviews, was used to help in the implementation of a system-wide college planning tool (Herndon, 2011). The report also described how the experience of implementing the technology shed light on other processes that could be improved in the future.

A common theme across the descriptive documents is that the implementation of an iPASS technology often clarifies technology's role in a reform effort and often helps identify institutional processes that may need to change, such as how long-term academic planning is carried out. Although the descriptive documents typically described internal processes that are idiosyncratic to individual institutions, personnel from other colleges and systems may still find them useful. Indeed some descriptive documents highlighted factors that the authors felt other colleges should consider before implementing iPASS in order to maximize its potential impact. One report (Pistilli, Willis, & Campbell, 2014) indicated that institutions should use data to inform institutional practices when planning on how best to implement iPASS technologies. Other reports suggested that colleges should seek to better ensure that iPASS reforms meet stakeholder needs by conducting a needs assessment of end users prior to implementation (Bradford, 2010; Herndon, 2011; Norris & Baer, 2013). Findings from the descriptive documents may inform the next wave of iPASS reforms as more institutions begin to think through the best ways to implement and encourage the use of iPASS technologies.

3.2 Output reports

The 12 output reports we reviewed focused fairly narrowly on the reporting of output data related to iPASS technologies and did not typically describe the implementation approach or intervention design in any detail. These documents reported on usage of technology, such as the number of times a student logged into particular software or the number of early alert flags raised. Output reports also included data on student use of support services such as tutoring services or the number of times a student met with an advisor. For example, one case study of comprehensive student services provided for online students at Lone Star College reported on the number of chat sessions attended, number of tutoring sessions attended, and number of early alert flags raised (Britto & Rush, 2013). Another report examined usage and opinion survey data collected from students using the Degree Compass tool for program planning (Whitten, Sanders, & Stewart, 2013). Neither report related these outputs to student outcomes.

Output reports are helpful for understanding how staff, advisors, and students use iPASS technology and the extent to which iPASS tools are being adopted at particular colleges. They may thus be useful in identifying potential implementation and user adoption challenges and in interpreting or forecasting student outcomes. For example, if an output report shows that faculty are not using an early alert system to identify at-risk students, one would not expect positive outcomes resulting from the implementation of such a system. Note, however, that the output reports we saw did not provide any direct evidence about whether the implementation of iPASS technologies led to improvement in student outcomes. Nevertheless, output reports can help shed a light on implementation fidelity, or the degree to which an intervention is administered as intended.

3.3 Correlational outcomes studies

The five correlational outcome studies we examined attempted to infer the influence of iPASS on student outcomes such as attendance, grades, and retention. However, given the methods used in these studies, the associations between an iPASS intervention and the measured outcomes cannot be interpreted as causal. Most of these studies did not make a convincing argument about how iPASS interventions alone could have caused the identified impact on student outcomes. Methodological challenges

included small sample sizes, lack of controls for other possible influences on observed effects, and the comparison of outcomes among potentially dissimilar groups.

For example, Arnold and Pistilli (2012) examined the retention rates of three cohorts of students using the early alert system Course Signals and compared the retention rate of students who enrolled in a course with Course Signals with the retention rate of students who did not enroll in a course using Course Signals. The study did not control for students' preexisting characteristics such as demographic background and prior academic performance, and it also did not take into account when the students enrolled in courses using Course Signals—only that they did enroll at some point during their academic career. Control and treatment groups were created post-hoc based on whether or not students enrolled in a course with Course Signals—rigorous methods such as randomization were not used in the creation of comparison groups.

Thus, even though this study found a positive correlation between enrollment in courses with Course Signals and retention rates, one cannot be sure that use of the iPASS tool actually caused the difference. Students in Course Signals and non-Course Signals courses may have had different characteristics. Or, professors who chose to use Course Signals may represent a different, potentially more student-success focused group of faculty compared with professors who chose not to adopt Course Signals in their classrooms.

Lastly, correlational studies focused on a single iPASS functionality, such as early alerts, and therefore were not able to estimate the full potential impact of an overarching iPASS reform effort.

3.4 Rigorous outcomes studies

We define rigorous outcomes studies as those that, while not necessarily causal, provide clear evidence that the research is reliable and valid, with estimated impacts that can be convincingly linked to the intervention rather than other causes. We include well-executed studies with both experimental designs (randomized control trials) and quasi-experimental designs—such as regression discontinuity (RD) and propensity-score matching (PSM). These kinds of studies are effective in limiting the possibility that confounding factors might differ between the two comparison groups.

We found only four such studies. We include two of these with reservations because they did not provide complete methodological information. For example, one policy brief reported using PSM but provided too few details to assess how well the design was applied. While we were unable to adequately assess the rigor of two of the four studies, we decided to include them, in large measure because there are so few studies in this category. We discuss the findings of these studies below in the section called Evidence of Impact.

3.5 Limitations of the literature

Overall, we found three main limitations to the iPASS literature we examined. First, the studies we examined tended to have a narrow focus. For example, while some studies attempted to examine the effects of an iPASS technology or intervention component on student outcomes, they did so with little consideration of the broader iPASS approach described earlier. The drawback from such a narrow focus is that it leads to an incomplete test of the efficacy of an iPASS intervention. While iPASS is meant to be a holistic approach, encompassing both technology and advising structures and processes, most studies examined only one component of a broad intervention effort (by focusing, e.g., on whether or not a technology tool was used rather than how it facilitates engagement in new forms of advising).

Second, the literature on iPASS is still rather new and developing, and there is little available research on implementation fidelity. To what extent is iPASS implemented as intended? Is a particular intervention or array of interventions producing the immediate changes in student experience and advisor experience that were planned and anticipated under the design? The current literature is mostly silent on these questions. Examining implementation fidelity can be an effective means to identify implementation challenges and to explore how the intervention may need to be refined. Assessing implementation fidelity is necessary to fully evaluate the impact of the reform. If iPASS is not implemented well, one should not expect to see improved rates of retention and completion.

Finally, few studies identify if and how iPASS impacts student outcomes (Shulock & Koester, 2014). As a whole, the current body of iPASS literature is not very useful in connecting the use of iPASS technologies to improved student outcomes, nor

does it explain or identify the mechanisms by which iPASS might influence student outcomes. A helpful tool to understand the relationship between individual processes and outcomes is a logic model, which details each sequential step in an intervention and the corresponding actions and effects that might result by it (see Figure 1 below for an example). Creating a clear iPASS logic model is a critical exercise for understanding how an iPASS reform may affect student outcomes.

4. Evidence of Impact

As noted above, the state of the current iPASS literature reflects the nascent stage of iPASS reform. Documents focus primarily on understanding how institutions implement iPASS tools and initiatives. Additionally, studies which do attempt to attribute improved student outcomes to iPASS often fall short methodologically. In this section we discuss the four rigorous outcomes studies we found that provide some evidence of potential iPASS impact.

Though the studies in this section are not strictly causal—the observed effects they found may have alternative explanations—when taken as a group, these studies used a variety of sound methods and data to arrive at similar conclusions. In addition, these four studies focused on different functionalities of iPASS tools and found positive impacts, which gives us some confidence in our provisional conclusion—though it should be noted that none constitute a test of the full iPASS approach given their focus on a single functionality.

Overall, we find preliminary evidence that iPASS-oriented interventions positively impact student outcomes, particularly when the interventions emphasize personalized student support (Bettinger & Baker, 2014; Civitas Learning, 2014; Lackner & Wynne, 2014; Milliron, Malcolm, & Kil, 2014). We would expect similar or even larger impacts from the more robust, integrated iPASS interventions now being launched around the country. In other words, because most studies examine a single functionality of an iPASS tool, such as early alerts or course planning, the effect sizes reported here may ultimately provide lower-bound estimates for the potential of a comprehensive iPASS reform effort to improve student success. Furthermore, we posit that there may be

a multiplicative effect of iPASS when the intervention addresses more than one function to holistically support students at each step in their academic experience (see Karp et al., 2016). For example, early alerts and course planning are likely to have a greater impact together than if those functions were administered independently.

The most compelling causal evidence is found in a study of technology-mediated coaching.³ The coaching program, InsideTrack, used a variety of communication methods including phone calls and targeted, personalized text messages to help students set goals, identify connections between short- and long-term goals, learn self-advocacy, and improve time management and study skills. Using a randomized control trial, Bettinger and Baker (2014) evaluated the impact of the coaching service on 13,555 students across eight different postsecondary institutions, including two- and four-year colleges in both the public and private, not-for-profit sectors. The participating colleges and InsideTrack randomly assigned students across 17 cohorts to a treatment ($N = 8,049$) or control group ($N = 5,506$). Students assigned to the treatment group received coaching services delivered online and by phone for up to 18 months. Coached students persisted at significantly higher rates 6, 12, 18, and 24 months following random assignment. At both 6 and 12 months, coached students persisted to the next semester at rates approximately five percentage points higher than uncoached students. At 18 and 24 months, coached students persisted at three and four percentages points higher than students who were not assigned to receive coaching.⁴

Quasi-experimental studies have also found positive impacts resulting from iPASS-oriented interventions. Importantly, like Bettinger and Baker (2014), they found that the use of technologies coupled with other personalized student interventions—rather than technology on its own— influenced student outcomes. For example, in a study of early alerts, Lackner and Wynne (2014) found that students receiving an early alert via

³ The study meets the highly rigorous Institute of Education Science's What Works Clearinghouse (WWC) evidence standards (part of the research meets the WWC standards without reservations, and part of it meets the standards with reservations).

⁴ The five percentage point increase in persistence found in Bettinger and Baker (2014) is similar to effect sizes found in a 2008 study of learning communities, a non-iPASS student success initiative (Scrivener et al., 2008). Scrivener et al. (2008) found that participants were 5.6 percentage points more likely to be enrolled in college three semesters post-program participation. However, this intervention's impacts were not sustained over longer periods of time. A more recent study of learning communities (Weiss, Visher, Weissman, & Washington, 2015) found a positive impact on credits earned, but no impact on student persistence.

email who also sought out tutoring persisted at higher rates than students who received an alert and did not seek tutoring. Lackner and Wynne used a PSM research design to control for potential differences in the characteristics of alerted students who did and did not seek tutoring. The authors estimated that flagged students who went to tutoring improved their likelihood of earning 10 or more credits by seven percentage points (23 percent versus 16 percent) compared with similar matched students who were flagged but did not attend tutoring.⁵ Thus, student alerts in combination with individual student support improved student outcomes.

Similarly, Milliron, Malcolm, and Kil (2014) found that early alerts combined with personalized contact positively influenced student outcomes. In a series of three studies at three institutions, the authors used a predictive analytic tool to identify at-risk students and intervene through targeted emails and phone calls. Over the course of multiple semesters, the intervention was first refined (for example, by adjusting timing, content, or messaging medium) and tested in order to establish an effective approach and then tested to estimate its impact. Sample sizes in the colleges were 15,000, 68,000, and 10,000 students. Each of the three colleges randomized students into control and treatment groups. The treatment group received targeted communications from faculty while the control group did not receive any intervention. For two of the colleges, a PSM approach replaced randomization in subsequent semesters due to operational challenges. Comparisons of treatment and control students within colleges found that treatment students were between 3.0 and 7.6 percentage points more likely to persist to the next term.⁶

In addition to studies highlighting the positive impact of coaching and alert-focused interventions on student outcomes, we also reviewed a study that found positive apparent effects for an iPASS reform focused on course planning. Austin Community

⁵ For context, a study completed at Chaffey College measured the impact of Enhanced Opening Doors, a non-iPASS program focused on supporting students on academic probation (Scrivener, Sommo, & Collado, 2009). After two semesters, program participants earned 2.7 more credits than control group members on average.

⁶ For comparison, Castleman and Page (2016) examined the impact of the use of financial aid text reminders, which is not considered an iPASS tool, because the intervention is not intended as part of a holistic approach to student support. Students at community colleges who received text messages were 14 percentage points more likely to persist to their sophomore year than community college students who did not receive the text alerts. The authors did not find a measurable impact among students in four-year institutions.

College and technology vendor Civitas Learning (2014) used PSM methods to analyze students engaged in technology-mediated course planning. The college matched 35,000 students on characteristics associated with a student's likelihood to persist, including GPA, terms completed, and credits earned. Students who used the degree planning tool were 2.4 percentage points more likely to persist compared with matched students who did not use the tool. The study also found a positive correlation between how often students used the tool and their persistence rates. Students who used the tool 5 or more times showed a 7.3 percentage point increase in persistence over similar students who did not use the tool 5 or more times during the length of the study (three semesters). However, this study does not provide full documentation of research methods; thus, the study's rigor cannot be confirmed.

5. Discussion and Recommendations

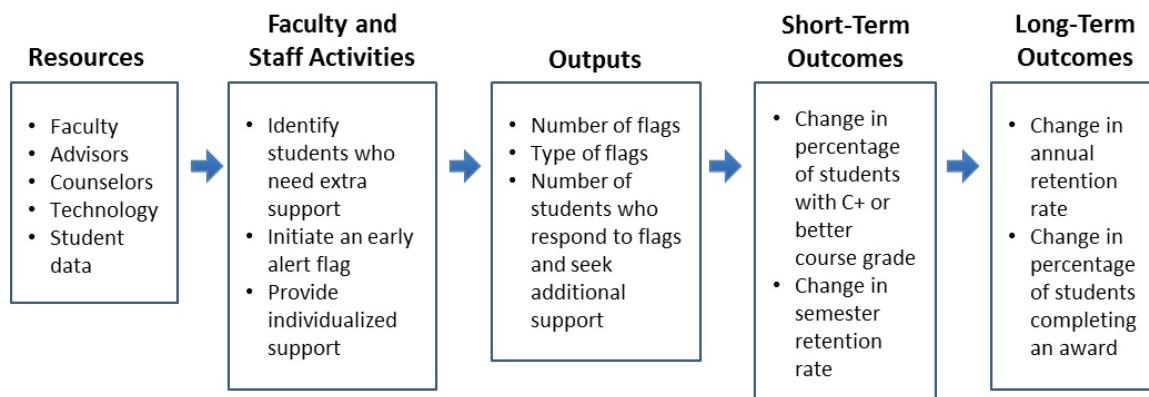
While much of the literature on iPASS is only descriptive, it does offer limited support for the potential effectiveness iPASS. Most of the research focuses on one iPASS functionality rather than iPASS as a comprehensive effort. A number of studies provide suggestive evidence linking iPASS to improved student outcomes; however, few studies have been able to make causal claims about the effectiveness of iPASS interventions. Using evidence to determine if and how iPASS supports student success is an important next step, with implications for both student outcomes and institutional resources.

To move from the current largely descriptive state of iPASS literature toward more rigorous evaluations of iPASS, we make the following recommendations to colleges and researchers who plan to engage iPASS reform and research.

1. Create an iPASS logic model that illustrates the relationship between iPASS tools, interventions, and anticipated subsequent outcomes, and adequately measure the inputs, outputs, and ultimate outcomes. In order to better understand the efficacy of iPASS, the field needs to explicitly postulate a chain of events that shows how an iPASS intervention can lead to improved student outcomes. This could be accomplished through

the use of a logic model. A sample logic model detailing how an early alert may improve student retention is shown in Figure 1.

Figure 1
Sample iPASS Logic Model – Early Alert System



A logic model details the sequential steps that occur in an intervention and the corresponding changes in outputs and outcomes that arise from it. A logic model clearly articulates the resources that are needed in an intervention—whether human or technical—along with a set of activities or actions that are required to administer the intervention and understand its impact. Resources for an iPASS intervention (see Figure 1) may include faculty, technology, and student data, while the activities include those actions which initiate the intervention, such as a faculty member identifying and sending an early alert flag to a student. The intended outcomes of the intervention include both (1) the outputs that describe the direct results of the intended activity (e.g., number of flags sent and the number of students who receive and potentially act on those flags), and (2) the benefits that are expected to occur as a result of the intervention—positive changes in short-term and long-term outcomes. In our logic model example, a long-term benefit of an early alert intervention is an increase of student retention.

A logic model strengthens research and practice in two critical ways. First, it helps practitioners understand both the resources and processes that are needed to adequately engage in a reform effort. By clearly identifying each step in the intervention,

colleges can better understand what is required at each step and make refinements prior to implementing the iPASS intervention. Often during the implementation process, a college will need to reconsider its advising processes. For example, does the college track if a student has met with an advisor? Without clearly understanding how an intervention is delivered and how students are affected at each step, a college will be unable to identify what parts of the intervention are working.

Second, the logic model can also be used as an evaluation tool to assess whether the intervention has met its intended purpose, or to help identify areas for improvement. For example, are faculty, staff, and students engaging in the activities prescribed in the logic model? Students receiving an early alert about academic performance may, for instance, reach out to an advisor but never take subsequent action such as attending tutoring to improve their performance. The use of a logic model can help the reform team identify and react to this problem. In the case of the tutoring example, the college could survey students who did not seek out tutoring after receiving an alert to better understand why they did not, and it could then use this information to improve student use of advising and tutoring services. A logic model is an important tool colleges can use to understand more precisely how an intervention does and does not affect behavior and thereby identify weak links in the reform.

2. Treat iPASS as a holistic approach to advising reform. As colleges implement more comprehensive student outreach and support, attempting to examine the impact of a single iPASS functionality in isolation is increasingly less practical. Most iPASS studies we examined focused on one technology tool coupled with some form of individualized student support (e.g., early alert as the technology tool and intrusive advising as the improved support). However, iPASS is intended as a broad reform approach integrating multiple interventions, which together may have a multiplicative impact on student outcomes. Thus, research is needed that attempts to assess the broader impact of a suite of technology-mediated supports rather than a single functionality in isolation.

3. Clearly define and use rigorous research methods. Researchers should clearly describe their methods and research design. Most studies we examined did not adequately

explain how the research was conducted. It is important that researchers make such information available. Doing so can help others interpret the strength of the findings. It can also help college personnel and others who may be interested in undertaking similar research.

Researchers should also strive to use rigorous methods. Studies employing mixed methods, experimental designs (randomized control trial), or quasi-experimental designs (e.g., regression discontinuity, difference-in-difference, and propensity score matching) can provide the necessary rigor to test for program impact. The What Works Clearinghouse operated by the Institute of Education Sciences is a recommended resource on designing and delivering studies that meet credible, high standards.

6. Conclusion

iPASS is a relatively recent approach, and few studies are available that rigorously evaluate its effects. Nonetheless, early findings suggest that iPASS interventions may have a positive impact on student outcomes, including persistence and credit accrual. However, current research does not examine iPASS as a holistic approach to student success but rather focuses on individual iPASS-oriented interventions. Additional studies using robust methods are needed to investigate whether iPASS improves student outcomes, especially for at-risk populations—including students from under-represented minorities and students of low socioeconomic status, who may have the most to gain from the reform. Future research should approach iPASS holistically, employ rigorous research methods, and clearly articulate how particular iPASS interventions are intended to improve student outcomes.

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Appendix

**Appendix Figure A.1
Colleges/Universities Institutional Research Websites Searched**

• Arizona State University*	• Queensborough Community College*
• Austin Community College*	• Ramapo College of NJ
• Austin Peay College*	• Rio Salado College*
• California Community Colleges*	• Sinclair Community College*
• California State University, Fresno	• South Texas College
• Colorado State University*	• Trident Technical College
• Columbus State Community College*	• University of Central Florida*
• Community College of Philadelphia	• University of Delaware
• Dona Ana Community College	• University of Hawaii*
• Eastern Mississippi Community College	• University of Maryland*
• Georgia State University*	• University of Michigan
• Guttman Community College	• University of Nebraska Lincoln*
• Indiana State University*	• University of North Carolina at Charlotte
• Ivy Tech Community College*	• University of South Florida*
• Miami Dade College	• University of Texas at Arlington*
• Middle Tennessee State University	• University of Texas at El Paso*
• Montgomery County Community College*	• University of Toledo*
• Morgan State University	• UT Texas at San Antonio
• Northeast Wisconsin Technical College*	• Valencia College*
• Northern Arizona University	• Virginia Community Colleges
• Northern Essex Community College*	• West Virginia University
• Patrick Henry Community College	• Whatcom Community College
• Purdue University(Calumet)*	• Zane State College

*Achieving the Dream leader schools

Appendix Figure A.2
iPASS Technology Vendor Websites Searched

• Austin Peay's Degree Campus	• eAdvisor
• Blackboard	• EBI Mapworks
• Campuscruiser	• Ellucian
• CampusLabs	• Jenzabar
• Civitas Learning	• MyEdu
• Connectedu	• Sinclair's MAP/SSP
• Course Signals	• Starfish/Hobsons
• EAB	• Valencia's LifeMap

Appendix Figure A.3
Sample of iPASS Terms Searched

• Advising reform + technology	• Integrated Planning and Advising for Student Success (iPASS) + outcomes
• College name + predictive analytics	• IPAS + advising
• College name + student success + technology	• iPASS
• College name + early alert	• iPASS + Gates Foundation + outcomes
• College name + IPAS (including technology assisted advising, full spelling)	• IPAS
• e-advising	• Predictive analytics
• e-advising + iPASS	• Signals + Purdue
• Early alert	• Student success + technology
• Electronic advising	• Technology + advising
• Integrated Planning and Advising System (IPAS)	• Technology + advising + community college
• Integrated Planning and Advising for Student Success (iPASS)	• Technology + advising in higher education

Appendix Figure A.4
CCRC Assessment of Evidence Series: Definitions of Rigor

Rigor 1	The pattern of findings could very likely be caused by participant selection effects, or by some other factor the author did not take into account.
Rigor 2	Findings are fairly sound, even if not necessarily definitive. Alternative explanations are possible, but evidence/logic/common sense suggests that they are either unlikely, or likely to play a relatively small role.
Rigor 3	Findings are highly convincing; it is difficult to think of alternative explanations (beyond those the author convincingly rules out.)